

ON A *TRACHYPTERUS* FROM NEW SOUTH WALES.

BY J. DOUGLAS OGILBY.

So little is known about the life history of the fishes belonging to this family that any new facts, however apparently trivial in themselves, which relate to their appearance and distribution acquire exceptional value, and should be recorded in full; especially should the changes which are now known to take place during the progress of the fish towards maturity be carefully noted and the results tabulated. For it is only by the collection and collation of these scattered references that we may in time hope to gain some insight into the economy of these strange denizens of the ocean depths.* It is therefore with great pleasure that I am enabled to lay before you to-night a detailed description of a young example which was recently washed ashore near Newcastle, and fortunately came into the possession of the authorities of the local Museum. For the opportunity of examining this rare fish I am indebted to the courtesy of Mr. Alfred Finckh, of the Technological Museum, who kindly placed the specimen at my disposal for the purposes of the present paper.

Before, however, proceeding to describe the Newcastle example, it seems to me advisable to briefly review the meagre literature of the genus, so far as it refers to those specimens which have been recorded from the south-western Pacific.

* An excellent commencement of this very necessary work has been made by Emery, who, in a valuable paper published in the "Atti Acad. Lincei, Rome. iii. 1879, pp. 390-395, ff. 1-6," gives details of the examination of twenty-three specimens, and shows that three Mediterranean forms—*T. spinolæ*, *T. tenia*, and *T. iris*—which had always been recognised as distinct, are but successive stages in the growth of one and the same species; the true name of which should be *Trachypterus trachyptera* (Gmelin). Unfortunately I have not been able to consult Emery's article.

Just ten years ago Günther* wrote as follows:—

“The instances of the occurrence of this genus in the Pacific are very few, viz., *Trachypterus altivelis* (Kœber)† from Valparaiso, *Trachypterus weychardti* (Philippi)‡ also from the Chilian coast, and *Trachypterus arawatae* (Clarke) from the coast of New Zealand.”

In addition to these, however, he refers to a species described by Bleeker from the East Indian Archipelago under the name of *Trachypterus semiophorus*,§ and himself records a very young example dredged by the Challenger in the neighbourhood of the Philippine Islands.

To these I may add the occurrence of *Trachypterus altivelis* on the coast of New Zealand as reported by Hutton, and of the same species subsequently noticed from the seas of Tasmania by Johnston; of a large specimen from Manly Beach described by Ramsay as *Regulecus jacksoniensis*; of three specimens obtained on the Victorian coast and figured by McCoy as *Trachypterus tania*; and finally of a species described as new by Jordan and Gilbert under the name of *Trachypterus rex-salmonorum*|| from the open sea outside of the Bay of California.

Confining myself to the species of which we have authentic records from the south-western Pacific, as being of more immediate interest to Australian biologists, the following list of specimens will, I believe, be found accurate:—

1. *Trachypterus altivelis*, Hutton, Trans. N. Zeal. Inst. v. 1873, p. 264. A dried specimen in the Auckland Museum; length 500 millimeters.

* Zool. Challenger, xxii. p. 72, 1887.

† Sitzb. Ak. Wien, xxxiv. i. 1859, p. 437, pl. i.; this is the only Pacific species mentioned by Günther in his Catalogue of Fishes (iii. p. 303).

‡ Arch. f. Nat. xli. 1874, p. 118, pl. iii.; described from a photograph.

§ I am unable to find any description of this species or even any reference to the work in which it is described.

|| Proc. Calif. Ac. Sc. (2) iv. 1894, p. 144, pl. ix.

2. *Trachypterus altivelis*, Hutton, Trans. N. Zeal. Inst. viii. 1876, p. 214. An alcoholic specimen in the Otago Museum.
3. *Trachypterus arawata*, Clarke, Trans. N. Zeal. Inst. xiii. 1881 (April), p. 195, c. fig. Jackson's Bay, New Zealand; specimen and type of species in the Colonial Museum, Wellington, in alcohol. Length 90 millimeters.†
4. *Regalecus jacksoniensis*, Ramsay, Proc. Linn. Soc. N.S. Wales, v. 1881 (May), p. 631, pl. xx. (= *Trachypterus jacksoniensis*, Ogilby, Catal. Fish. N.S. Wales, p. 43, 1886). Manly Beach, New South Wales; type of the species a plaster cast with the skin stretched over it in the Australian Museum, Sydney; length 1400 + x millimeters.
5. *Trachypterus altivelis*, Johnston, Proc. Roy. Soc. Tas. 1882, p. 123. Spring Bay, east coast of Tasmania; specimen in the Royal Society's Museum, Hobart.
- 6, 7, 8. *Trachypterus tania*, McCoy, Prodr. Zool. Vict. dec. 13, pl. cxxii. 1886. Portland, Victoria; specimens in the National Museum, Melbourne; length 63 to 256 millimeters.

The trachypterid now under consideration is therefore the ninth example of which we have any definite record from the Australasian Colonies, and as it differs somewhat from any of the others I am constrained to submit the following detailed description, and in the belief that it will prove to be worthy of at all events subspecific rank, the name *polystictus* is here proposed on account of the numerous spots which ornament the head and body.

† In an editorial note to Clarke's paper Sir James Hector remarks:—"The author has overlooked the occurrence of another specimen of this species" (? species of this genus) "*T. altivelis*, Kner, in the Auckland Museum; and other specimens, since collected, are in the Wellington and Dunedin Museums." I can find no record of any such specimens, and am, therefore, unable to include them in my list.

As it is evidently more closely allied to *T. jacksoniensis* than to *T. arawata* I shall refer to it in future as

TRACHYPTERUS JACKSONIENSIS POLYSTICTUS, subsp. nov.

Contour of head and body :—The depth of the body is greatest immediately behind the head, from whence it tapers gradually to the slender rod-like caudal peduncle, which is evenly curved upwards and forwards, and terminates in a blunt point. The abdominal profile is inconspicuously crenated and apparently somewhat sinuous, but the condition of the specimen is not sufficiently perfect to justify me in definitely asserting this latter character. The depth of the body at the base of the pectoral fin is $3\frac{1}{2}$ in the total length.*

The upper profile of the head inclines obliquely backwards from the tip of the snout to the origin of the nuchal crest so as to form an angle of about forty-five degrees with the horizontal axis of the body.

The head.—*Comparative measurements* :—The length of the head† is rather less than its depth and $5\frac{3}{5}$ in the total length; the greatest width of the head is close behind the eye and is one-third of the length.

Jaws :—The premaxillary processes are included within a deep groove which extends backwards to above the middle of the orbit, their length being three-fourths of that of the head. The maxillary is short and broad, its length $2\frac{3}{5}$ in the head, its greatest width a little more than half its length; it is of an exceedingly delicate membranous structure, and is profusely ridged with well developed striae, which radiate from a point near its anterior margin, most of the rays on the outer side being ramose; it does

* All measurements in which the "total length" forms one of the factors must be looked upon as approximate only since the curvature of the vertebral column posteriorly prohibits absolute accuracy.

† The border of the opercle on each side is greatly frayed so that it is impossible to determine it accurately; I have therefore taken the measurements from the tip of the snout to the middle of the scapular arch.

not extend backwards beyond the anterior border of the eye; the mandibular rami are extraordinarily deep, the hinder and lower borders being of equal length. The mouth is situated on a level with the inferior border of the eye.

Teeth.—The dentition is imperfect, the only teeth now remaining being a single very strong sharp acutely-conical one on each ramus of the upper jaw, behind which is a much smaller but similarly shaped tooth; no teeth can be detected on the lower jaw.

Eye.—The eye is very large and round, situated in the middle of the upper surface of the head, its longitudinal diameter being $2\frac{1}{5}$ in the length of the head.

Branchial apparatus.—All the opercles are ornamented with radiating striæ similar to those of the maxillary, as also is the articular bone; the opercle is of moderate size, and appears to have been produced backwards well beyond the scapular arch; it is bordered below by the enlarged and band-shaped interopercle, which overlaps and almost entirely conceals the small aborted subopercle; the preopercle is crescentic and with the interopercle extends forwards to beyond the vertical from the anterior border of the eye, leaving below the eye a triangular naked space bordered by the hinder margin of the dentary and the preopercle; the branchiostegal rays are six in number, and there are nine gill-rakers—so far as I can ascertain without injuring the specimen—on the lower branch of the anterior arch; they are short, stout, and subclaviform; narrow at the base, compressed and knife-like above, the second (from the articulation) the longest, about $\frac{2}{5}$ of the diameter of the eye.

The fins.—*Dorsal fin*.—The anterior detached (or semi-detached) portion of the dorsal fin originates a little in advance of the posterior border of the eye and but a short distance behind the termination of the premaxillary groove; it consists of five rays, all of which are broken off at a short distance above the base; the portion of the first ray which is still *in situ* is armed anteriorly with curved spinules, as also is that of the second, but

in a lesser degree.* The second portion is fairly perfect and is composed of 121 rays, the longest of which are inserted well behind the middle of the fin and are about one-fourth longer than the head; these rays are exceedingly slender and fragile; and each ray is provided with a strong basal spine on either side, and with numerous spinules irregularly arranged along its entire length.

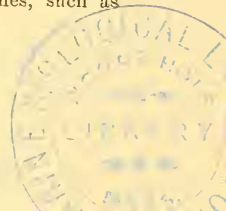
Ventral fins :—The ventral is inserted well behind the base of the pectoral, and consists of eight rays, all of which are articulated, the first, however, being considerably stronger than the others, while the last is split into three portions to the very base; all the rays are more or less imperfect, and are quite smooth.

Pectoral fins :—The pectoral is moderately developed and is composed of fourteen smooth rays, the second of which is the longest, about a third of the length of the head; it is inserted somewhat lower than the suture between the opercle and subopercle, in front of the posterior edge of the scapular arch and is directed upwards and backwards.

Caudal fin :—The caudal fin is very narrow at the base and consists of two strong outer rays and five or six slender intermediate ones; the outer rays are quite smooth, without any indication of external spinules; the length of the fin is about three-eighths of that of the head. I am unable to find any indication of a lower caudal lobe, the upper lobe being continued along the same axis as the vertebral column.

Lateral line :—The lateral line originates behind the eye, immediately above the upper angle of the scapular arch, and runs along the middle of the side below the vertebral column to the inferior border of the caudal peduncle, each poriferous area being armed with a short, stout, conical spine.

* So far as can be seen from the remnants these rays were articulated, and it is therefore incorrect to call them spines as is usually done; there is in fact but one dorsal fin, the anterior rays of which are somewhat distinct from the posterior portion, as in some heterosomatous fishes, such as *Notosema*.



Coloration :—Silvery, suffused with a darker gray above, the entire head and body ornamented with numerous well-marked bluish spots.

The specimen measures about 140 millimeters to the base of the caudal fin and was found on the beach near Newcastle.

Comparing this description with those of my predecessors, as referred to in the list which I have given above, we find that (1) in the Auckland Museum specimen the only character of any value for specific distinction mentioned by Hutton is that the dorsal rays number about two hundred.* The few other characters mentioned would, roughly speaking, apply equally well to any member of the genus; this example measured twenty inches.

(2) Hutton's second specimen, of which no details are given, only served to confirm that author in the belief that the New Zealand species was identical with that of the south-eastern Pacific.

(3) With the publication of Clarke's paper we hail the first attempt at an original detailed description of an Australasian *Trachypterus*, and it, therefore, merits more careful analysis. That author was exceptionally fortunate in obtaining his specimen in absolutely perfect condition, the fish, which measured about three and a half inches, having been taken "in a pool at high-water mark" where it "had evidently been embayed on the tide retiring;" it was subsequently placed "in a tin full of sea-water, in which it lived for some short time."

Omitting for the present all reference to the fins, our attention is immediately drawn, on comparing our specimen with Clarke's figure, to the great dissimilarity in the shape of the head and the contour of the body between the two fishes. The almost vertical antero-superior profile of the head in *arawata* is markedly different from that of the New South Wales fish which is inclined backwards at an angle of about forty-five degrees to the longi-

* The importance of this character is denied by McCoy, to whose views I shall have occasion to allude later on.

tudinal axis of the body. The eye is much smaller, being (according to the figure) about one-third of the length of the head; now if the two fishes belonged to the same species we would expect this character to be reversed, the rule being that the younger a fish is the larger the eye is proportionately; it is also situated midway between the upper and lower profiles of the head and much more forward, the cleft of the mouth and the whole of the maxillary being below the level of the eye, and the latter extending backwards to the vertical from its posterior border, whereas in our species the cleft of the mouth is on the same level with the inferior edge of the eye and the maxillary is wholly in front and only partially below it.

The similarity in the number of dorsal rays is sure to attract attention, but the comparative height of the second dorsal is not nearly so great and there is a more pronounced disproportion between the strength of the rays in the two dorsals, so much so as to make me somewhat sceptical as to whether the rays of the first dorsal ever were much produced in the Newcastle specimen. The origin of the first dorsal in *arawatae* is considerably further forward, but this is doubtless in some measure owing to the much greater verticality of the profile and the anterior position of the nuchal crest. Clarke lays considerable stress on the presence of a pair of cutaneous lobes bordering the caudal peduncle above and below, which he views in the light of adipose dorsal and anal fins, but these are merely membranous expansions of the skin due to immaturity and would assuredly not have been noticeable except in the case of such a perfect example as its describer was fortunate enough to possess; they are of no specific value.

The first ventral ray in *arawatae* is spoken of and figured as a spine (V. 1 + 5) and is serrated, in which characters it differs from our fish.

The upper lobe of the caudal fin is inserted almost at right angles to the vertebral axis and the outer rays are serrated externally throughout their entire length, while there is a conspicuous lower lobe consisting of six rays on the same plane as

the vertebral column, the fourth ray being slightly elongate and thus reminding us of *Stylephorus*.

(4) In the Manly fish the contour of the head, the extension of the maxillary, and the position and appearance of the opercles are much the same as in the present fish, as also is the origin of the dorsal fin; the body, however, is much more elongate, but this is due to the age of the specimen, which, I am inclined to believe, is also responsible for the lowness of the dorsal fin. The abdominal profile is straight, but is protected by numerous spinose processes. The length of the head is but little less than the greatest depth of the body, which is far behind the pectoral fins; from this point the depth rapidly decreases into the long and slender tail. The premaxillary groove is very long, about four-fifths of the length of the head. The eye is in much the same position as in the Newcastle specimen, but, as is to be expected in so much older an individual, is proportionately smaller, its diameter being contained $3\frac{1}{2}$ times in the length of the head, the contraction making it appear much lower on the side of the head. In Ramsay's figure a large subopercle is shown, but no such bone is really present, the inter- and sub-opercles being as described above; the ventral tubercle is also behind the base of the pectoral, not below it as stated in his description. The position and state of the specimen unfortunately preclude me from determining whether the dorsal rays were smooth or rough.

(5) Johnston gives no account of the Tasmanian example, contenting himself by copying the fin formula of *altivelis* from Günther, and it is, therefore, impossible to decide as to which species it properly belongs; probably it is best to associate it with the following.

(6) The position of the eye in both of the examples figured by McCoy—one of which, as will be seen by reference to the list given above, is much larger, the other much smaller than ours—is apparently very different from that of the present fish, being behind the middle of the head and separated from the maxillary

by a preorbital space equalling or nearly equalling its diameter, but this appearance is deceptive and is caused by McCoy having unfortunately figured both his examples with the premaxillary extended to its fullest possible length, and given therefore a quite erroneous idea of the aspect of the fish in its natural state, since it is only under special conditions that the mouth is protruded in the manner figured; this is also responsible for the wide space between the termination of the premaxillary processes and the origin of the dorsal fin. In neither of McCoy's specimens is the height of the dorsal rays so great as in ours nor is there any mention made of spinules on the rays; the caudal fin is, however, much longer and there is a distinct basal lobe; the pectoral fin is much smaller, but is perhaps imperfect; in the larger example the first ray of the ventral bears four spines in front near the base, but in the smaller it is smooth as in our fish.

Compared with *arawata* the whole appearance of McCoy's youngest specimen is so different that I have little hesitation in pronouncing them distinct.

Writing of the difficulties which confront the student in any attempt to discriminate between the various forms of trachypterids McCoy makes the following remarks:—

“The relative length of the rays of the anterior portion of the dorsal fin, the caudal fin, and the ventral fins in different individuals is due to the excessive delicacy and fragility of the rays—as fine as the finest hair and as brittle as spun glass—so that the slightest touch in separating the rays to count them breaks them in pieces. I think also that the young are deeper and shorter in proportion than the old; and, consequently, the specific differences founded on the greater number of times the length of the head or the depth of the body are contained in the total length are not to be trusted for specific characters when the length of the specimens is different. I also believe the numbers of rays in the dorsal fin increase with the length of the body of the individual.”

While agreeing that great alterations take place in the figure of these fishes with increasing age, the labours of Emery and

others having indeed undeniably demonstrated so much, I can not so readily see my way to accepting the suggestion thrown out in the last sentence quoted, since it necessitates an increase in the number of neural spines and a corresponding increase in the vertebræ, in fact a thorough reorganisation of the entire skeletal framework of the fish. I do not know of any instance among the higher forms of animal life where so important a change occurs, and I may be pardoned for doubting its accuracy until some more reliable evidence than has as yet been brought forward is adduced.

But, while admitting that these fishes pass through many and puzzling changes in their passage from youth to maturity, and recognising, therefore, the necessity for exercising the greatest caution in dealing with specimens of different ages but from neighbouring localities, it is equally incumbent on us to guard against falling into the opposite error by carelessly uniting together, on such a plea as the above, what may prove to be very distinct species, sooner than trouble ourselves to sift to the bottom every tittle of evidence which we may be able to accumulate; a slovenly habit which, though unworthy of the name of science, is unfortunately altogether too prevalent.

While, therefore, I am absolutely opposed to the contention of the limited and, I am happy to believe, ever decreasing number of observers who hold that the separation of districts by wide areas of sea and land is no bar to the specific identity of the creatures inhabiting them,* it must be borne in mind that, so far as our present knowledge extends, the conditions which regulate animal life at great depths below the surface of the ocean are everywhere more or less identical, at least so far as temperature, the most important factor affecting the distribution and migration of fishes is concerned; this being so, we know of no obstacle to the cosmopolitan distribution of similar forms. Nevertheless, even here it seems to me that it would be wiser to regard as

* The union of such species as *Squalus acanthias*, *Clupea sprattus*, *Engraulis encrasicolus*, and others with their southern analogues is a case in point.

distinct all species occupying such widely disconnected areas as, for instance, the north-eastern Atlantic and the south-western Pacific, rather than that they should be united together on the insufficient characters deducible from unique and oftentimes imperfect specimens.

Holding these opinions it will not, therefore, be surprising that I shall not attempt to identify our trachypterids with any of those described from the Atlantic and Mediterranean, nor indeed with *altivelis*, though it is quite possible that they belong to that species.* I think, however, there can be no reasonable doubt that the individual described by Ramsay from Manly Beach is the adult form of those so beautifully figured by McCoy from Portland, nor that Hutton's and Johnston's fishes must be placed in the same category with the latter, the dark spots on most of these examples being merely indicative of immaturity.

With *arawata* and the present fish it is more difficult to deal; the contour of the head, and especially the forward position of the nuchal crest in the former, suggests a second species, for McCoy's smallest example was of much the same size as Clarke's, and yet the profile of the head was inclined backwards at almost as great an angle as in his older fish, and the same remark applies to the anterior position of the origin of the dorsal fin in *arawata*. As for the Newcastle specimen, which, if not of the same species, is at least closely allied to *jacksoniensis*, I have not found any mention of a *Trachypterus* having the head and body dappled; where the colour markings, if present, are so constant to the same pattern as in these fishes, one is apt to attach greater importance to colour variations than is perhaps warranted by the circumstances of the case. In, therefore, giving the subspecific name *polystictus* to the Newcastle fish I only wish to indicate the existence of such a form, since if a similar variety of other species, such as *arcticus* and *trachyptera*, is known, the value of this as a differential character would be greatly diminished.

* Of *T. semiophorus*, as before stated, I have seen no description, and I am not, therefore, in a position to judge of its affinity to our species.

In the present tentative state of our knowledge I am inclined to synonymise the Australasian species as follows:—

1. *TRACHYPTERUS JACKSONIENSIS*.

? *Trachypterus altivelis* (not Kner), Hutton, Trans. N. Zeal. Inst. v. 1873, p. 264, and viii. 1876, p. 214, and xxii. 1890, p. 281; Johnston, Proc. Roy. Soc. Tas. 1882, p. 123, and 1890, p. 34; Macleay, Proc. Linn. Soc. N.S. Wales, ix. 1884, p. 43; Gill, Mem. Ac. Nat. Sc. Washingt. vi. 1894, p. 120.

Regalecus jacksoniensis, Ramsay, Proc. Linn. Soc. N.S. Wales, v. 1881, p. 631, pl. xx; Macleay, Proc. Linn. Soc. N.S. Wales, vi. 1881, p. 55.

Trachypterus jacksoniensis, Ogilby, Catal. Fish. N.S. Wales, p. 43, 1886.

Trachypterus tænia (not Bloch & Schneider), McCoy, Prodr. Zool. Viet. dec. 13, pl. cxxii. 1886; Lucas, Proc. Roy. Soc. Viet. (2) ii. 1890, p. 32.

Coasts of south-eastern Australia, ? Tasmania, and ? New Zealand.

1a. *TRACHYPTERUS JACKSONIENSIS POLYSTICTUS*.

Coast of New South Wales.

2. *TRACHYPTERUS ARAWATÆ*.

Trachypterus aruwatæ, Clarke, Trans. N. Zeal. Inst. xiii. 1881, p. 195, c. fig.; Hutton, Trans. N. Zeal. Inst. xxii. 1890, p. 281; Gill, Mem. Ac. Nat. Sc. Washingt. vi. 1894, p. 120.

Coast of New Zealand.

The former of these species is evidently analogous to the Mediterranean *T. trachyptera*; in reference to the height of the dorsal I am very doubtful as to the expediency of laying much stress on that character; I think it probable that, like the rays

of the ventral and caudal fins, and of its own anterior semi-detached portion, this fin becomes lower with increasing age. In the forward position of the nuchal crest our second species approaches *T. rex-salmonorum*, and stands in a similar position to it that *T. jacksoniensis* does to *T. altivelis*.

In my judgment *arcticus* should be removed from the genus *Trachypterus*, of which the *Cepola trachyptera* of Gmelin is the type,* and be left as the representative of the genus *Bogmarus* of Bloch and Schneider.

* Jordan and Evermann (Check-List, p. 490) give *trachyrhynchus* as the type of *Trachypterus*; I do not know of any such species; possibly it is a misprint.